TELEFONICA UK LIMITED RESPONSE TO:

“Defragmentation of spectrum holdings in the 3.6-3.8 GHz band”

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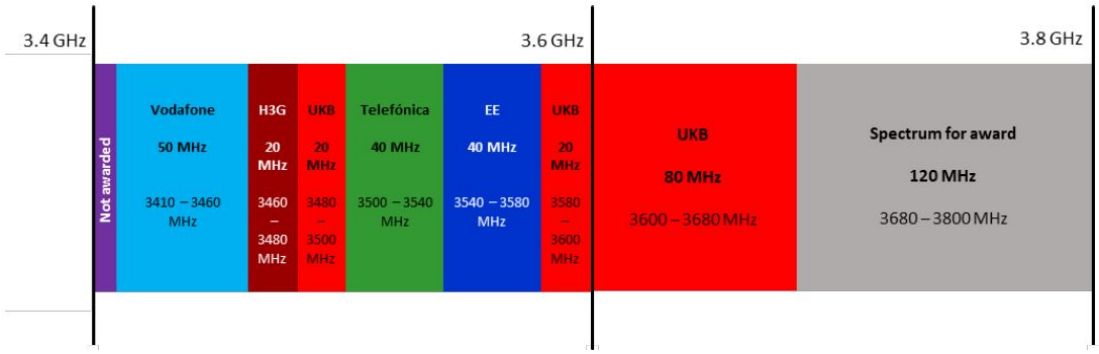
I. EXECUTIVE SUMMARY

1. Telefonica UK Limited ("Telefonica") welcomes the opportunity to respond to Ofcom's consultation on defragmentation of spectrum holdings in the 3.4-3.8 GHz band[1] ("the Consultation"). This band has emerged as the most important block of frequencies for the launch and development of 5G mobile services. Governments worldwide are working to ensure that their local operators have the opportunity to acquire large blocks of contiguous spectrum, ideally up to 100 MHz, to provide the highest 5G speeds and capacity to their customers.

2. In the UK, for legacy reasons, the current allocation of spectrum within the 3.4-3.8 GHz band is fragmented, as illustrated in Figure 1. One operator, H3G (which owns UKB), has two separate blocks of spectrum of 40 MHz and 120 MHz, in different parts of the band. The three other operators – Telefonica (O2), BT (EE) and Vodafone – have blocks of 40-50 MHz each. An additional 120 MHz of spectrum at 3680-3800 MHz will be made available in Ofcom's next spectrum auction.

Figure 1: UK 3.4-3.8 GHz band



Source: Ofcom, Figure 1 (p3) from the Consultation

Defragmentation is needed if the UK is to be a leader in 5G

3. The Government stated in its Future Telecoms Infrastructure Review that "…*we want the UK to be a world leader in 5G".*[2] The timely release of spectrum to be used to deploy 5G mobile is a key enabler for realising this ambition, and we support Ofcom's ambition to hold the auction for 3.6 GHz spectrum soon. It is even more important that this award produces an efficient allocation of 5G spectrum. The obvious best outcome for UK consumers and for UK society would be for all MNOs operating in this band to have contiguous blocks. As Ofcom recognises, this will require defragmentation.

[1] Defragmentation of spectrum holdings in the 3.4-3.8 GHz band, Ofcom. 10 July 2019: https://www.ofcom.org.uk/consultations-and-statements/category-3/defragmentation-spectrum-holdings

[2] Future Telecoms Infrastructure Review, Department for Digital, Culture, Media & Sport. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/732496/Future_Telecoms_Infrastructure_Review.pdf

4. Failure to defragment the band would be an expensive setback for the UK's 5G ambitions. As we show in Annex 1 to this response, we estimate that if BT, Telefonica and Vodafone deploy 5G with two blocks of spectrum, each of 30-50 MHz, they would in aggregate have to invest [✂] on equipment to replicate the equivalent network capacity from deploying a single contiguous 80 MHz block. Even with this extra spend, our headline and average speeds would be [✂], so the user experience will be degraded. These costs, which take into account expected improvements in 5G technology over time, could be avoided if the band is defragmented, freeing up investment capital for other uses, such as improving 5G coverage.

5. The release of additional 3.6 GHz spectrum provides a unique opportunity for Ofcom to play a critical active role in facilitating the defragmentation of the band. To date, Ofcom has placed far too much faith in the secondary market to address fragmentation. There is a high risk that trading amongst the MNOs will not resolve the situation. Spectrum trading is most likely to be successful when the interests of all operators are aligned, but this is not the case in the UK. Unfortunately, Ofcom's policies to date[3] have favoured one operator, H3G, allowing it to establish a 'kingmaker' position, from which it can attempt to extract windfall gains from rivals in return for moving its spectrum, or otherwise expect anti-competitive rents from blocking rivals from acquiring larger contiguous blocks.

The only way to guarantee defragmentation is by full band assignment

6. Telefonica believes strongly that Ofcom should, as part of the current award, implement "full band assignment". This can and should be done by requiring bidders, as a condition of their participation in the combined award of 700 MHz and 3.6 GHz, to consent to a variation of any frequency ranges they already hold in the 3.4-3.8 GHz band to ensure that all operators are able to acquire contiguous blocks.

7. Whilst Telefonica has proposed full band assignment previously, Ofcom has so far failed to conduct a proper evidence-based assessment of the proposal by reference to its statutory duties under the Communications Act 2003 ("CA 2003") and the Wireless Telegraphy Act 2006 ("WTA 2006"). That failure is unexplained and unjustified. As Ofcom tacitly accepts, it plainly has the statutory power under s.14 and schedule 1 of the WTA 2006 to implement full band assignment. Moreover, it is, in Telefonica's submission, the only means by which Ofcom can ensure the fulfilment of its core statutory duties.

8. In summary:

   a) Full band assignment is the only means of guaranteeing defragmentation. There is a high likelihood that the secondary market will fail to deliver an equivalent outcome. Adding a negotiation phase to Ofcom's existing plans may make it

[3] Ofcom has twice foregone obvious opportunities to facilitate a reconfiguration of the 3.4-3.6 GHz band, first as part of the 2018 award (when it could have awarded frequency flexible licences) and secondly as a condition for the liberalisation of spectrum held by UKB (owned by H3G). As a result, H3G has been able to consolidate its holdings into two separate blocks which are placed in a way that makes it impossible for all its rivals to establish larger contiguous assignments, unless H3G moves.

somewhat more likely that a partial reconfiguration will take place, but it provides no clear path to all operators gaining larger contiguous blocks.

b) An operator that ends up with two non-contiguous blocks, each of 40-50 MHz, will be [✂] relative to an operator with a contiguous 80-100 MHz block. We estimate that Telefonica would have to spend [✂] on equipment alone to achieve the equivalent capacity from a contiguous assignment. We present a detailed analysis of the technical and commercial downsides of operators deploying with non-contiguous spectrum in Annex 1 of this submission.

c) The technical costs for all incumbents, including H3G, to shift their holdings within the 3.4-3.8 GHz range are small. This is because, within a designated range, equipment for this band can be retuned remotely. Even if some equipment needs to be replaced, the costs will be modest because deployment of 5G is only just beginning. In this context, expecting other operators to make windfall payments to H3G to shift position is unreasonable. H3G has previously claimed it wants to "make the air fair"[4]; our view is that it could not have any reasonable objections to full band assignment.

d) Ofcom risks undermining the efficiency of the auction process because bidder valuations will be polarized on outcomes that may facilitate or block particular trades, leaving them unable to express their true incremental values for acquiring different capacity levels and speed shouts.

e) Ofcom can address any incentive H3G might have to decline to participate in a full band assignment by making consent to the variation of existing frequency ranges within the 3.4-3.8 GHz band a condition of participation in both the 3.6-3.8 GHz and the 700 MHz award. It could also take other measures that make participating in full band assignment more attractive for H3G, such as giving H3G first choice of frequency position in the reconfigured band and refunding assignment round fees from the PSSR award as a credit against auction payments or future annual licence fees (ALF).

9. Failure to defragment the entire band will not just cause harm to operators, but also to their customers. Operators that have to deploy using fragmented assignments will [✂]. Looking forward, if the market moves towards unlimited data tariffs, operators with split and relatively smaller contiguous holdings will [✂] versus those with equivalent contiguous 5G holdings.

10. Unless Ofcom acts now, the UK risks becoming a 5G laggard in Europe. Almost every other country in Western Europe has either awarded or has plans to award large contiguous blocks across the 3.4-3.8 GHz band. This is the norm for which 5G network and handset equipment in Europe is being developed. Exposing UK operators to the risk of having to manage with smaller discontiguous blocks is not just bad policy, it is a direct threat to the competitiveness of the UK economy.

[4] In late 2016, H3G launched a campaign called 'Make The Air Fair' with the aim of generating public support for tighter competition measures for the UK PSSR auction, as described by Ofcom at: https://www.ofcom.org.uk/__data/assets/pdf_file/0028/98128/Make-The-Air-Fair.pdf

11. In the circumstances, Ofcom should decide now to adopt full band assignment or should, at the very least, conduct a proper consultation on Telefonica's proposal followed by a full evidence-based assessment of the merits. A failure to do so would constitute a breach of Ofcom's statutory and public law duties, and would be amenable to legal challenge.

12. Telefonica outlines the case for full band assignment below. However, given the short deadline imposed by Ofcom in the Consultation, Telefonica has had limited time in which to gather relevant evidence. Therefore, should Ofcom be unwilling to implement full band assignment immediately, it is essential that Telefonica be given a proper opportunity to adduce evidence and submissions on the merits of full band assignment and, in particular, on how it would guarantee defragmentation and the fulfilment of Ofcom's statutory duties.

In the absence of full band assignment, we would support the proposal for a negotiation phase in the assignment stage

13. We welcome Ofcom's acceptance that defragmentation cannot be left entirely to the secondary market. Thus, if it was not possible to implement full band assignment, we would support the proposal for a negotiation phase as part of the Assignment Stage for the 3.6 GHz award. If winning bidders have the opportunity to agree an assignment of frequencies, there is an increased likelihood that the outcome will be one that facilitates trades which defragment the wider band. This also reduces risk for bidders who may value adjacency to a potential trading partner more than any particular frequency position. To be clear, Telefonica's support for this proposal is strictly without prejudice to its primary position on the need for full band assignment and Telefonica reserves its right to challenge any decision by Ofcom to reject that solution, or any failure to give it full and proper consideration.

The negotiation phase must allow for partial agreements

14. To have the best chance of success, Ofcom must implement the second of its two sub-options for the negotiation phase, which is to allow a partial group of winning bidders to agree that they be assigned adjacent spectrum. If unanimity were required, any one party could block an outcome that is in the national interest for selfish reasons. Moreover, unanimity is more likely if partial agreements are possible because this reduces scope for hold-outs trying to exploit their negotiation power.

15. Ofcom's proposed design for the negotiation round has a number of important features, which we support:

    - The negotiation phase will take place after assignment round bidding but before the winner determination.
    - The unanimous negotiation phase will last for 10 working days with provision for a further 5 working days for companies to agree partial deals.
    - All winners of 3.6 GHz spectrum, including ones winning less than 20 MHz, should be eligible to participate in the industry negotiation.
    - If all or any subset of bidders reach agreement, for the purposes of assignment round winner determination, these bidders will be treated as having bid zero

for all feasible assignments compatible with their negotiated agreement. This will mean that such winners can no longer impose an opportunity cost, nor block another winner from its preferred position amongst the residual outcomes. This approach maximizes incentives for honest negotiations.

We also agree that small winners be placed at top or bottom of the band

16. We support Ofcom's proposal to restrict winners of less than 20 MHz to a location at the top or bottom of the auctioned part of the band. This is a sensible measure to discourage rent-seeking behaviour. In particular, this rule would prevent winners of small amounts of spectrum – who should be frequency agile – from attempting to insert themselves between the frequencies awarded to MNOs that want to engage in a trade. For the avoidance of doubt, this is a helpful complement to the proposal for a negotiation phase, not an alternative that could achieve defragmentation by itself.

17. It is Telefonica's view that Ofcom should implement a band-specific cap of 140 MHz, which would preclude H3G from bidding for more 3.6 GHz spectrum unless it first sells some of its existing holdings. If H3G is able to bid in the auction and acquires more spectrum, Ofcom's proposed rules would not guarantee that H3G's new holdings would be adjacent to its existing ones. We support this approach. Such a guarantee should only be provided to H3G if there is full band assignment. If – contrary to the national interest – H3G blocks full band assignment, then it should not receive special treatment.

The negotiation phase should follow an SMRA, not a CCA

18. [✂]. We reiterate our view that a combinatorial format is <u>not</u> appropriate for the award of 3.6 GHz, especially if there is no provision for full band assignment. A key issue is that there are focal points for the demands of Telefonica, BT and Vodafone, owing to our need to establish viable 5G portfolios and position ourselves for trade options to create contiguous footprints. We anticipate that this will [✂] . In this context, the second price rule in the CCA cannot be expected to reflect real opportunity cost, and prices are unlikely to be efficient or fair, and could be highly asymmetric.

19. In its decision on setting the annual licence fee (ALF) for UKB's 3.4-3.8 GHz holdings, Ofcom concluded that the appropriate, non-discriminatory response was to set these fees at the same level as the clearing price from the PSSR award. For consistency with PSSR auction and ALF decision, an auction with a uniform price rule must be used for this award too. Any other approach would, in our view, breach Ofcom's obligations under UK and European law not to discriminate between operators, given the constraints that Ofcom has placed on bidders and its failure to address defragmentation fully.

20. In the remainder of this response, we address the questions set out in the Consultation.

II. SUB-OPTIONS FOR THE NEGOTIATION PHASE

Ofcom Question 1: Do you have any comments on the two sub-options for the negotiation phase set out above, including your preference between the two? Please give reasons for your views.

21. Before turning to the detail of Ofcom's proposed sub-options, Telefonica addresses the issue of full band assignment. Whilst we made submissions on this in our response to Ofcom's December 2018 consultation on the award of the 700 MHz and 3.6-3.8 GHz spectrum bands ("the December 2018 Consultation"), Ofcom has apparently failed to take those submissions into account in its current Consultation.[5] This failure is unexplained and unjustified. Accordingly, Telefonica takes this opportunity to reiterate its proposal for full band assignment. We trust that Ofcom will now give it the full and proper consideration that it deserves.

22. If the UK is to be a world leader in 5G, then Ofcom must ensure that all operators can combine the spectrum they acquire in the 3.6 GHz auction with their existing holdings in the 3.4-3.8 GHz band. This is the only way to ensure that all operators can form the large contiguous blocks of spectrum that are needed for optimal 5G deployment. Any approach that results in one or more operators having non-contiguous blocks of spectrum is obviously inefficient. It would mean that some operators will face higher costs of 5G deployment and some portion of UK consumers will not get as good a service as would otherwise be possible.

23. The only approach that is guaranteed to defragment the 3.4-3.8 GHz band is full band assignment. This approach maximizes the economic benefits to the UK. As we explain below, it is also a low-cost solution for the industry, as the costs for operators (including H3G) of moving frequencies are small compared to the value of the spectrum. In contrast, Ofcom's current preference to rely on the secondary market to reconfigure the band does not guarantee an efficient solution. There is a high risk that the market will fail owing to disagreement between the operators, one of which (H3G) has an incentive to try to game the situation to its own advantage.

24. Ofcom's proposal to allow for a negotiation phase as part of the Assignment Stage is not a substitute for full band assignment. It is, however, a significant improvement to Ofcom's initial auction design. Allowing for a negotiated assignment solution would make it somewhat more likely that operators can agree trades that at least partially defragment the band. As such, we would strongly support this proposal in the absence of full band assignment. As we explain below, the negotiation phase would have to allow for partial agreements in order to maximise the likelihood of it being effective.

Full band assignment is the best solution for the UK

25. The Government has been very clear that the UK should be a world leader in deploying 5G, and that mobile has a key role to play in facilitating the ubiquitous availability of high-quality broadband. Ofcom's number one focus in this award should be ensuring an

[5] Telefonica UK Limited Response to "Award of the 700 MHz and 3.6-3.8 GHz spectrum bands" (19 March 2019), §§168-174.

efficient allocation and assignment of 5G spectrum that supports this ambition. A fragmented assignment of the prime 5G band at 3.4-3.8 GHz would clearly run contrary to the Government's objective. It would leave some operators facing increased deployment costs and unable to deliver the very best services. This is not a small concern. As we set out in Annex 1, the cost implications for operators are [✂]. The downside for consumers, in terms of lower quality of service and competitive choice in 5G, could be even greater.

26. A "full band assignment stage" is the only approach that will guarantee defragmentation of the entire 3.4-3.8 GHz band. As we set out in our previous response, this can be achieved by having all operators, as a condition of their participation in the combined award of 700 MHz and 3.6 GHz spectrum, consent to a variation of any frequency ranges they already hold for the 3.4-3.8 GHz band to ensure that all operators have contiguous blocks. The exact position of each operator's contiguous block would then be determined in the assignment stage of the combined 700 MHz and 3.6 GHz award. The rules for this stage would be designed such that all licence holders in the 3.4-3.8 GHz band would receive contiguous spectrum.

27. Telefonica has proposed full band assignment on two previous occasions: in its response to Ofcom's June 2018 consultation on the variation of the 3.6-3.8 GHz licence held by UK Broadband (UKB), and in its response to Ofcom's December 2018 Consultation. Despite this, Ofcom has so far failed to conduct a proper evidence-based assessment of the proposal by reference to its statutory duties under the CA 2003 and the WTA 2006.[6] That failure is unexplained and unjustified. As outlined below, Ofcom plainly has the legal power to implement full band assignment and it is, in Telefonica's submission, the only means by which Ofcom can guarantee defragmentation and ensure the fulfilment of its core statutory duties.

28. In the circumstances, Ofcom should decide now to adopt full band assignment or should, at the very least, conduct a proper consultation on Telefonica's proposal followed by a full evidence-based assessment of the merits. A failure to do so would constitute a breach of Ofcom's statutory and public law duties, and would be amenable to legal challenge. It would, at the very least, represent a failure to consider relevant matters, including matters to which Ofcom is obliged to have regard under ss.3-4 of the CA 2003 and s.3 of the WTA 2006. Telefonica's rights in this regard are reserved in their entirety.

29. As outlined below, the case for full band assignment is a compelling one. However, given the short deadline imposed by Ofcom in the Consultation, Telefonica has had limited time in which to gather relevant evidence. Therefore, should Ofcom be unwilling to implement full band assignment immediately, it is essential that Telefonica and other stakeholders be given a proper opportunity to adduce evidence and submissions on the merits of full band assignment and on how it would guarantee defragmentation and the fulfilment of Ofcom's statutory duties.

[6] By Ofcom's own admission, its peremptory consideration of the proposal in the December Consultation enabled it to reach no more than an "initial view": Consultation §2.11. Given the importance of defragmentation to the future of 5G in the UK, an "initial view" is a wholly inadequate basis on which to reject full band assignment as a solution to fragmentation.

30. As Ofcom tacitly accepts at §§2.10-2.11 of the Consultation, it plainly has the legal power to implement a full band assignment.

31. Section 14 of the WTA 2006 empowers Ofcom, when making regulations for the award of wireless telegraphy licences, to specify requirements which must be met by applicants for a licence: s.14(3)(d). Whilst s.14(3)(d) contains examples of the requirements that may be imposed, those examples are non-exhaustive. Thus, the power to impose requirements as a condition of applying for a licence is not confined to requirements of any particular kind. It includes a power to require that bidders consent to a variation of the frequency ranges in any existing licences they hold within the same band, so as to ensure the assignment of contiguous blocks within that band.

32. Section 10 and §6 of schedule 1 of the WTA 2006 empower Ofcom to vary the terms, provisions or limitations of any wireless telegraphy licence. Whilst Ofcom is empowered by §8 of schedule 1 to include restrictions on this power within the licence itself, the current licences issued for the 3.4-3.8 GHz band do not contain any such restrictions. Accordingly, as Ofcom itself recognises[7], the discretion to vary licences is a broad one.

33. In addition to having the power to implement full band assignment, such assignment would, in Telefonica's submission, be consistent with Ofcom's core statutory duties. In circumstances where it would enable Ofcom to achieve defragmentation, and thus the efficient allocation of 5G spectrum, full band assignment would, for example, ensure the fulfilment of Ofcom's duties:

    a) to further the interests of citizens and consumers: s.3(1) CA 2003;

    b) to secure the optimal use of the spectrum and the availability throughout the UK of a wide range of services: s.3(2) CA 2003;

    c) to have regard to the desirability of encouraging investment and innovation in relevant markets; the desirability of encouraging the availability and use of high-speed data transfer services; and the different needs and interests of all persons who wish to make use of the spectrum: s.3(4) CA 2003; and

    d) to have regard to the efficient management and use of the spectrum; the development of innovative services; and competition in the provision of electronic communication services: s.3(2) WTA 2006.

34. It is notable that, in its recent decision to vary UKB's licence for 3.6 GHz spectrum, Ofcom concluded that, as the variation would make a larger contiguous block available for use by other operators, it would have a positive impact on the optimal and efficient use of the spectrum.[8] It is difficult to see any basis on which Ofcom could reach a different conclusion in respect of full band assignment. As Ofcom recognised in the UKB decision, there are situations in which "*in order to ensure that spectrum (which is a scarce and finite state resource) is efficiently managed and used in the interests of citizens and*

[7] Ofcom's Decision on the Variation of UK Broadband's Spectrum Access Licence for 3.6 GHz Spectrum §3.5.
[8] Ibid. §§4.8, 4.33.

consumers, it is appropriate for Ofcom to make spectrum management decisions which include changes to the frequencies which are licensed for use".[9]

35. In its December 2018 Consultation, Ofcom suggested that requiring bidders to make their existing holdings within the 3.4-3.8 GHz available as a condition of participation in the 3.6-3.8 GHz auction "could" amount to revocation of the existing licences and would thus be subject to the limitations contained in those licences (including a 5-year written notice period): §§6.17-6.19). However, for the reasons given in Telefonica's response to the December 2018 Consultation – which Ofcom appears to have ignored in its current Consultation – those concerns are unfounded. Moving a block of spectrum held by an operator to a different frequency within the same band and with the same technical characteristics constitutes a variation rather than a revocation of the existing licence. Indeed, that is precisely how Ofcom characterised the position in the UKB decision. Ofcom made clear in that decision that the "swapping" UKB's spectrum at 3680-3689 MHz for the available spectrum at 3600-3605 MHz constituted a mere variation to UKB's licence rather than an award of new rights; there was no suggestion that it might amount to a revocation: §§4.158 – 4.169. The same reasoning applies to full band assignment and the post-auction swapping of existing spectrum within the same band.

36. Ofcom's main objection to full band assignment appears to be that "*there would be no certainty that H3G would enter the award*" if it was required to contribute its existing holdings to an assignment stage (Consultation §2.11 and December 2018 Consultation, §6.23). We agree that full band assignment only makes sense if all existing licence holders participate; otherwise, Ofcom may not be able to guarantee that everyone will receive contiguous spectrum. There are, however, concrete measures – as set out below – that Ofcom can take to make it very unattractive for H3G (or anyone else) not to participate, and to reduce any downside to H3G from participating. Ofcom has failed so far to consider these measures.

37. Ofcom also said that "*the design and implementation of a full band assignment stage could be complex given the number of possible assignment options*." (December 2018 Consultation, §6.25). This is incorrect. We set out below an approach which would be simple to implement using tools familiar to Ofcom.

38. Ofcom also pointed out that two licensees – H3G and BT – paid additional fees for specific positions in the 3.4 GHz band (December 2018 Consultation, §6.20). This is a problem of Ofcom's own making and cannot reasonably be relied upon to the detriment of other operators such as Telefonica. The very fact that bidders submitted substantial bids for particular positions is indicative that having contiguous spectrum and/or frequencies within a 200 MHz bandwidth is highly valuable. Had Ofcom instead issued frequency flexible licences, with an expectation of future reconfiguration, it is likely that bids would have been much smaller, perhaps zero in some cases. If BT or H3G are required to move position, these fees should be reimbursed. They can be credited with a reduction against either winning bids in the auction or future payments of annual licence fees (ALF) for existing spectrum. (This provision for a credit against ALF ensures that Ofcom would under no circumstances have to pay out money, thus addressing Ofcom's concern regarding the assignment fees already having been paid into the appropriate

[9] Ibid. §4.165.

Consolidated Fund in accordance with the CA 2003.) The Government can easily afford to provide such a credit, as the modest compensation required is a small fraction of the expected revenues from the next auction and is a small price to pay to realise the benefits to consumers and the economy from having better 5G services.

39. Full band assignment will require some flexibility on the part of all UK operators to shift frequencies within the 3.4-3.8 GHz band. As we explain in Annex 1, this is neither technically nor financially challenging. Within a designated range, 5G equipment for this band can be retuned remotely. Therefore, if an operator is only required to move frequencies within the relevant range (e.g. within Band 42 or within Band 43), the cost of moving is effectively zero. Similarly, if an operator has equipment that covers both relevant ranges, the cost is minimal even if it has to move outside its existing range (e.g. from Band 42 to Band 43 or vice versa). Since H3G's existing 100 MHz spectrum sits across Band 42 and Band 43, we presume it must already be using equipment that covers both bands. Even if some equipment needs to be replaced, the costs will be modest because deployment of 5G is only just beginning.

40. We propose the following measures to address all concerns regarding full band assignment so as to maximise the likelihood of defragmentation:

    a) *A bidder that failed to contribute its existing holdings would be barred from participation in the combined award of 700 MHz and 3.6 GHz*.[10] We anticipate that the risk of missing out on 700 MHz would be an adequate incentive to ensure H3G participates. As Ofcom acknowledges, H3G is eager to acquire more low frequency spectrum (December Consultation §6.36). This is a proportionate measure given the obvious public interest benefits from full band assignment and the very limited costs and technical difficulties involved. Telefonica believes that H3G would be keen to avoid delaying the forthcoming auction (for example, by litigating a full band assignment), because of its desire to acquire low frequency spectrum for its 5G service. Indeed, given the scope for Vodafone and Telefonica to utilise their existing 900 MHz holdings for 5G[11], we anticipate that H3G will want the opportunity to acquire 700 MHz spectrum as soon as possible.

    b) *Ofcom and the Government could issue a combined statement emphasising the importance of full band assignment to support the national 5G goal*. Given that UK's 5G future at stake, it is reasonable for Ofcom and the Government to exert a degree of "soft power" on all operators to cooperate in reconfiguring the band.

    c) *The rules for the assignment round could be adapted to minimize risk for H3G*. We recognise that H3G is in a unique position going into this award in that it is the only operator that already has a viable 5G position and that it is transitioning spectrum from a legacy business (UKB). To minimize any costs for H3G, Ofcom could draw up the assignment stage rules in a way that gives H3G maximum control over its final assignment outcome, subject to all other bidders being able to receive contiguous holdings. Our proposal is to allow H3G first choice on its assignment position and

[10] In our previous consultation response, Telefonica proposed that 700 MHz and 3.6 GHz be allocated in sequential auction stages as part of the same award.
[11] 900 MHz is supported in many 5G devices already launched in the UK

exempt it from paying any fees for its new position. This would enable H3G to minimize the extent that it shifts frequencies, should it so choose.

d) *All licence holders that participate would be refunded any previous assignment round fees from the 3.4 GHz award*. The refund amount would be deducted from the amount of the license holder's combined winning bid amounts for 700 MHz and 3.6 GHz spectrum. In the event that the refund exceeds the amount due, any residual payment to the operator would be provided as a credit against future ALF payments. This potential to secure a refund would be a further incentive for H3G to participate in the award.

e) *Full band assignment would only go ahead if all operators opt into the process*. In case one or more of the existing four licensees did not apply to participate in the award, then Ofcom would switch to the negotiation approach. We agree this is the best fall-back option if H3G is not willing to move frequencies.

41. Specifically, under our proposal, the assignment round could work as follows:

a) As part of the application process for the combined award of 700 MHz and 3.6 GHz, each existing licensee would be required to contribute their 3.4-3.8 GHz spectrum to the assignment stage. Any licensee that failed to apply or accept this condition would be excluded from the award. In the expected case where all four MNOs participate, the assignment stage would proceed as follows. (Otherwise, in case one or more operators do not apply, then the assignment stage would proceed as currently proposed by Ofcom, i.e. with assignment bidding followed by a negotiation phase.)

b) Following the conclusion of the 3.6 GHz allocation stage, Ofcom would identify an exhaustive set of band plans for 3.4-3.8 GHz in which it is possible to assign contiguous spectrum to every operator. Optionally, existing holders of spectrum could be offered the right to have their spectrum in two non-contiguous blocks, if they prefer (in case this is important to H3G). Ofcom could grant itself discretion to cull the list of permissible band plans if it thought certain plans were undesirable for spectrum management reasons.

c) Each bidder would be presented with an exhaustive list of their own bid options compatible with the band plans identified in step (b). At this point, no information would be provided to bidders regarding the individual allocations of spectrum to other license holders.

d) H3G would be given first choice of position in the newly reconfigured band. It would be permitted to select any option from those identified in step (b). It would be awarded this option at zero price. In this context, the rules applicable to H3G could be linked in the regulations to the size of its existing holdings and/or its status as a holder of legacy licences. Given the clear and strong public interest in defragmentation, there is no good reason why H3G should want or be permitted to block full band assignment. However, Telefonica would be content for H3G's unique position to be reflected in this way in the rules for the assignment round.

e) Ofcom would update the list of bid options for remaining licensees, taking into account the location of H3G's spectrum. At this point, we propose that remaining

bidders be given full information about the spectrum allocated to each licence holder. This will give bidders the ability to take account of the value of being adjacent to other parties in their bid options.

f) The remaining licensees would then participate in a standard second price sealed bid assignment round, as used by Ofcom for previous awards.

42. Full band assignment is the only means by which Ofcom can guarantee defragmentation of the 3.4-3.8 GHz band. As explained above, the costs would be minimal and there are no other discernible disadvantages to this approach. As such, it is obviously preferable to Ofcom's proposal to rely on the secondary market to address defragmentation and far better suited to satisfying Ofcom's statutory duties. Ofcom needs to be realistic about the likelihood of defragmentation being facilitated by trading. Trading of spectrum between mobile operators is relatively rare. Most trades of mobile spectrum to date, in the UK and worldwide, have been from non-MNOs to MNOs.[12] Where trades between operators have taken place, they have typically involved swaps of spectrum or sales of unused spectrum between two parties with strong mutual incentives to make a deal.[13]

43. The situation at 3.4-3.8 GHz is not an easy one for the secondary market to resolve, as operator interests are not aligned. H3G already has a contiguous 100 MHz block, whereas as all other operators do not. This means that H3G can [✂], and has a significant interest in blocking competitors from acquiring similar capability. H3G has already boasted about this relative advantage in the media.[14] Absent full band assignment, the position of H3G's two blocks make it impossible for Vodafone to create a larger block without making a deal with H3G. BT and Telefonica together occupy 80 MHz of contiguous spectrum, so might have a bilateral path to increase their holdings through trades, but only if they can acquire contiguous spectrum in the 3.6 GHz auction. H3G is thus in the position of 'kingmaker': it can act to block its rivals in the expectation of exploiting a competitive advantage and/or attempt to extract windfall gains from rivals. In such a situation, efficient trades may fail to happen because the gains are so one-sided and there is a high risk the parties will not be able to agree on price.

44. Across Europe, other regulators are acting to ensure that multiple operators have access to the large spectrum blocks they need for 5G. In Table 1, we survey the approaches of

[12] Many of the examples of trades between non-MNOs to MNOs are in the United States, where licenses are owned in perpetuity and legacy businesses divest from spectrum assets. These include, for example, Verizon's acquisition of Straightpath Communications who owned mmWave spectrum (2017), AT&T's acquisition of Nextwave who owned 2.3 GHz spectrum (2012), and Sprint's acquisition of Clearwire who owned 2.5 GHz spectrum (2013). European examples of non-MNO to MNO trades include Qualcomm's sale of UK L-band spectrum to Vodafone and H3G, H3G's purchase of UKB, and MASMOVIL's 2018 acquisition of 40 MHz of 3.4-3.8 GHz spectrum from Eurona, a Spanish fixed-wireless business.

[13] An example is the 900 MHz swap between Telefonica UK and Vodafone UK set to finalize in July 2019. Owing to legacy 2G assignments, Telefonica and Vodafone each had the same quantity but fragmented, alternating spectrum in the 900 MHz band. To acquire larger, contiguous blocks, Telefonica and Vodafone UK agreed to move positions in the band to create 2x12.4 MHz blocks for each company. See https://www.ofcom.org.uk/manage-your-licence/radiocommunication-licences/mobile-wireless-broadband/below-5ghz for more detail.

[14] See http://www.mobilenewscwp.co.uk/2019/07/02/threes-5g-will-bring-trickle-down-benefits-to-4g-users/

other countries in Western Europe. The most common approach is to clear the band prior to allocation, enabling the regulator to guarantee assignments in contiguous blocks. Austria, Finland, Ireland, Germany and Switzerland all implemented this approach, and each now has 3 operators with contiguous blocks of 70 MHz or more. We expect most other countries, including France, Norway and Sweden, to do the same. There are some countries that, like the UK, have issues with legacy assignments. Amongst them: Italy chose to gerrymander the lot structure for the 200 MHz sold in 2018 so as to ensure two operators secured 80 MHz contiguous lots; and Spain is expected to announce an industry plan to defragment the 3.4-3.8 GHz band. In conclusion, absent defragmentation, the UK would likely lag every other country in Western Europe in terms of the size of contiguous blocks available to its leading mobile operators.

Table 1: Survey of approaches to contiguous spectrum allocation at 3.4-3.8 GHz

Country	Prioritising contiguous spectrum?	# operators with 70 MHz contiguous or more	Comments
Austria	Yes	3	Already allocated, 3 operators > 100 MHz
Belgium	TBD	0	Plans not yet announced
Denmark	TBD	0	Plans not yet announced
Finland	Yes	3	Already allocated, 3 operators > 100 MHz
France	Yes	0	Award in development; expected to prioritise contiguous assignment
Germany	Yes	3	Already allocated, 3 operators with 70-90 MHz
Ireland	Yes	3	Already allocated, 3 operators > 85 MHz (Airspan bid for an isolated 25 MHz block)
Italy	Yes	2	Only 3.6-3.8GHz allocated; all MNOs have contiguous spectrum with 2 operators with 80 MHz holdings
Luxembourg	Yes	0	Award in development; expected to prioritise contiguous assignment
Netherlands	TBD	0	Plans not yet announced
Norway	Yes	0	Award in development; expected to prioritise contiguous assignment within 300 MHz block
Portugal	TBD	0	Plans not yet announced
Spain	In process	1	3 of 4 operators have fragmented assignments but Regulator expected to announce an industry plan for defragmentation soon
Sweden	Yes	0	Award in development; expected to prioritise contiguous assignment within 300 MHz block

Country	Prioritising contiguous spectrum?	# operators with 70 MHz contiguous or more	Comments
Switzerland	Yes	3	Already allocated, 3 operators > 80 MHz
United Kingdom	No	1	3.5GHz not contiguous; H3G owns 3460-3500MHz and 3580-3680MHz; no plans to ensure contiguity across 3.4 and 3.6 GHz holdings

45. Outside Europe, regulators are also concerned about fragmentation. For example, in a June 2019 consultation, Canada's ISED announced that it will convert existing licences at 3.5 GHz to frequency agile blocks.[15] Licence holders will be required to include these blocks in the assignment round, thus ensuring bidders will secure contiguous spectrum blocks.

In the absence of full band assignment, negotiation offers a potential solution to defragmentation

46. Telefonica's submissions on the proposal for a negotiation phase, and on the proposal to restrict winners of less than 20 MHz, are strictly without prejudice to its primary position on the need for full band assignment and its right to challenge any decision by Ofcom to reject that solution, or any failure to give it full and proper consideration.

47. In the absence of full band assignment, a negotiation phase as part of the Assignment Stage for the 3.6 GHz award would be essential. The reality of the situation is that some bidders may have strong preferences to be next to a potential trading partner but be otherwise largely indifferent to their position in the band. Ofcom's assignment bidding rules, however, provide no mechanism for bidders to express such preferences. Practically, this makes it very difficult to know how to bid.

48. For example, consider the following realistic cases:

    a) There are three winning bidders (A, B and C) and two bidders (A and B) need to be next to each other to execute a trade. Either A and B could guarantee adjacency by securing the middle slot, but if they both bid for this, the loser will impose a high cost (price) on the winner. This creates an incentive for each one to bid low, hoping the other wins, but this could lead to Bidder C inefficiently winning the middle slot and blocking the trade.

    b) There are four winning bidders (A, B, C and D) and two bidders (A and B) need to be next to each other to execute a trade. There is no position that guarantees adjacency. Bidders A and B must resort to 'guestimating' the preferences of their potential trading partner.

49. In such situations, bidders cannot submit sensible bids and there is a high risk the assignment round fails to deliver an efficient outcome. Allowing for a negotiation phase

[15] ISED, June 2019, Decision on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Decisions on Changes to the 3800 MHz Band, SLPB-001-19.

is clearly superior, as it provides an opportunity for operators to agree obviously efficient outcomes and bypass the lottery of blind assignment bidding.

If negotiation is adopted, it is essential that partial agreements are allowed

50. Telefonica strongly prefers Sub-Option 2, with provision for partial agreement negotiation, for the following reasons:

    a) Without this approach, one party could block an outcome that is in the national interest for selfish reasons.

    b) Only this approach can stop a bidder using the assignment round to insert themselves between two parties, so as to block a trade for anti-competitive reasons or so as to extract windfall gains for moving later.

    c) Unanimity in negotiations is more likely if partial agreement is possible because this reduces scope for hold outs to try to exploit their position.

51. Ofcom's proposed design for the negotiation round has a number of important features, which we support:

    - The negotiation phase will take place after assignment round bidding but before the winner determination. In our prior consultation response, we proposed holding the negotiation phase before assignment bidding. However, we recognise that the existence of such bids at the time of negotiation may provide positive incentives for all bidders to reach a deal, so as to avoid imposing unnecessary additional costs on each other.

    - The unanimous negotiation phase will last for 10 working days with provision for a further 5 working days for companies to agree partial deals. This is consistent with the timetable we proposed. We agree that this should be sufficient time for parties to secure an agreement, and a reasonably tight deadline should prevent any single party drawing out the process unnecessarily.

    - All winners of 3.6 spectrum, including ones winning less than 20 MHz, should be eligible to participate in the industry negotiation. The process should be as inclusive as possible with the important caveat that no bidder should be allowed a veto on a partial deal.

    - If all or any subset of bidders reach agreement, for the purposes of assignment round winner determination, these bidders will be treated as having bid zero for all feasible assignments compatible with their negotiated agreement. This will mean that such winners can no longer impose an opportunity cost, nor block another winner from its preferred position amongst the residual outcomes. This approach maximizes incentives for honest negotiations.

52. We request that Ofcom clarify what rules will apply regarding confidentiality of bids and strategy once the negotiations stage has been opened. Telefonica would favour full transparency with respect to the outcome of the allocation stage and a relaxation of any confidentiality restrictions regarding bids already submitted in the assignment bidding round, so as to facilitate frank and honest negotiations without fear of inadvertently breaking a non-disclosure rule.

III. PLACEMENT OF WINNERS OF SMALL QUANTITIES OF SPECTRUM

Ofcom Question 2: Do you agree with our intention to restrict winners of less than 20 MHz to bidding for the top or bottom of the band?

53. Yes, Telefonica supports this proposal under a scenario in which full band assignment is not adopted. This is an appropriate back stop rule for the assignment in case negotiations are unsuccessful. In this case, such a rule would ensure that winners of large blocks of spectrum would be assigned adjacent blocks of spectrum. In the absence of full band assignment or successful negotiations, this is the outcome most likely to facilitate defragmentation through trading, as the bidders most likely to win blocks of 20 MHz or more are BT, Telefonica and Vodafone, which are the parties that would have to trade to defragment their spectrum. This back-stop rule, in turn, makes it more likely that the negotiation phase would facilitate some level of defragmentation, as bidders with less than 20 MHz will know that they cannot insert themselves in between larger winners.

54. As articulated by Ofcom in the Consultation, this rule would "*limit the risk of further fragmentation of the wider 3.4-3.8 GHz band resulting from strategic bidding*" (§2.33). Specifically, "*it would remove the possibility of a bidder winning a small* amount *of spectrum and bidding for the middle of the band purely for strategic reasons* (§2.34)." This is a material risk, given the predictable desire of certain MNOs, including Telefonica, to engage in post-auction trades, and the potential rent-seeking opportunity this creates for third parties. As discussed previously, we are particularly concerned that [✂].

55. Ofcom highlights a theoretical downside to this option, in that it would restrict the assignment location options for winners of both smaller and larger quantities, and potentially eliminate options with intrinsic value (§2.35). However, in practice, given the availability of equipment that works across the entire band and the absence of adjacent band interference concerns, we believe this is a non-issue. Indeed, as Ofcom notes, it is telling that this measure drew support from two MNOs and no objections in the previous consultation. This is therefore an acceptable constraint on bidder options that would cause no obvious harm but may facilitate a more efficient assignment.

56. We view this measure as complementary to the proposal for a negotiation phase to support defragmentation. For the avoidance of doubt, it is not a standalone alternative, as, by itself, it does not provide bidders with any certainty whether they will be next to any particular potential trading partner. We note that there would be no need for such a rule if Ofcom embraced the superior alternative of full band assignment, as then MNOs would not need to rely on trading to secure the large contiguous blocks of spectrum they need to deliver the best 5G services to UK citizens.

57. If this rule is adopted, it will need to be expressed in the regulations in a way that is robust to all possible allocation outcomes, including situations where there are two or more winners with less than 20 MHz of spectrum. In practice, we believe the rule will be more easily articulated if it is written in terms of a guarantee that all bidders winning more than 20 MHz will be co-located in adjacent frequencies. If it were drafted in this way, multiple bidders winning less than 20 MHz would be assigned spectrum (in at most two groups) adjacent to each other at the top or bottom of the band, leaving the middle of the band free for the assignment of large, adjacent blocks of spectrum.

58. There should also be a condition to relax the rule in case of an agreement in the negotiation phase (as proposed at §2.25 of the Consultation). We see no reason to preclude a smaller winner being next to larger winner if this is agreed either as part of a unanimous or partial agreement. In the case of a partial deal, the coalition members should be able to decide the order in which they will be adjacent but should have no control where they are placed relative to winning bidders who are not part of the coalition. Thus, a small winner in a two-party coalition would no longer have any guarantee that they would be next to another small winner, and a larger winner in a two-party coalition would no longer have any guarantee that they would be next to another large winner. This rule is essential to limit any scope for a two-party coalition to try and position themselves to blocks others from future trade options.

59. Specifically, we propose the following detailed rule:

    a. All winning bidders must receive contiguous spectrum.
    b. Unless clauses (c) or (d) apply, the following additional restrictions on the location of winning bidders apply:
        - For the purposes of winner and price determination, only outcomes in which all bidders winning more than 20 MHz are co-located will be considered.
        - By design, this means that all winners of less than 20 MHz must be co-located in one or two groups either at the top or bottom of the band.
    c. If there is a unanimous agreement in the negotiation phase, clause (b) does not apply.
    d. If there is a partial agreement in the negotiation phase that involves a "coalition" of two or more bidders:
        i. Prior to the winner and price determination, the coalition must pre-specify the assignment order from lowest to highest frequencies for each winning bidder that is part of the coalition.
        ii. If the coalition includes one of more bidders that won more than 20 MHz, then the entire coalition shall be treated as if it was a single bidder that had won more than 20 MHz for the purposes of implementing clause (b).
        iii. If the coalition includes only bidders that won less than 20 MHz, then the entire coalition will be treated as if it was a single bidder that had won less than 20 MHz for the purposes of implementing clause (b).
        iv. In all cases, for the purposes of winner and price determination, the coalition will be deemed to have made a valid bid of zero for all valid assignment bid options.

60. In our previous consultation response, we argued that H3G should not be allowed to bid for any more spectrum in the 3.4-3.8 GHz band unless it first relinquishes some of its exceptionally large holdings in this band. This remains our view. Notwithstanding this position, we recognise that it would be an efficient outcome if H3G were able to consolidate all its holdings in the band into a single block of spectrum. In the context of full band assignment, we would support such an outcome. However, in the current situation, where H3G has positioned itself as a road block to defragmentation, it would

obviously be unfair to other operators if H3G received any guarantee that if it acquired new spectrum, such spectrum would be adjacent to its existing 3.6 GHz holdings.

61. To level the playing field between operators, Ofcom could go further. If Ofcom decides to set a cap that permits H3G to bid for more spectrum in this band, then Ofcom should adopt a default rule that no party will be allowed spectrum adjacent to their existing holdings, unless this is agreed in the negotiation phase. This same rule should also apply to any partial coalition regardless of the order of bidders within the coalition. This rule would create a more level playing field between MNOs in a negotiating phase in the event that H3G won some new spectrum, as all parties would now have a stronger incentive to find a unanimous agreement.

IV. OTHER COMMENTS

Ofcom Question 3: Do you have any other comments on our proposals to include measures in the auction to help defragment the 3.4–3.8 GHz band?

62. Yes, in the event that Ofcom proceeds with its current proposal and does not adopt full band assignment, there are other improvements that Ofcom can make to its award design which would make defragmentation more likely. Many of these are auction rules that Ofcom should make regardless, as they are measures that should encourage bidders to follow valuation-based bid strategies instead of bidding strategically, and should increase the likelihood of an efficient, non-discriminatory allocation outcome.

63. Ofcom should adopt the following measures:

    a) It should separate the allocation of 3.6 GHz spectrum and 700 MHz spectrum into two separate auction stages as part of the same award.

    b) It should use an SMRA-type format with a uniform price rule, not a combinatorial format, such as the CCA.

    c) It should establish a band-specific cap for 3.4-3.8 GHz, set no higher than 140 MHz.

    d) It should tailor the information rules to reduce the likelihood of strategic bidding in the allocation stage and facilitate negotiation in the assignment stage.

64. We set out the benefits from implementing each of these measures in the following paragraphs.

3.6 GHz spectrum should be sold separately from 700 MHz

65. We strongly oppose the allocation of 3.6 GHz and 700 MHz in the same bidding stage. The two spectrum bands are not substitutable and Ofcom's rationale for including them in the same bidding stage would seem to be motivated solely by its proposal to award coverage lots. Allowing bidders to switch demand between 700 MHz and 3.6 GHz offers no benefit to bidders who are bidding on the basis of intrinsic values. It may, however, open up opportunities for strategic play, as we explained in our previous consultation response.

66. One of the strategic risks we identified if the two bands are sold simultaneously is that [✂]. This, in turn, may result in one or more of the other MNOs failing to win the spectrum needed to facilitate trades to defragment the band.

67. A simple solution is for Ofcom to sell the two bands in separate allocation stages of the same award. Alternatively, they could be sold simultaneously but with no linkages in bidding across the bands. Either of these approaches will ensure timely award of both bands but without the scope for strategic bidding across unrelated bands. (Moreover, if Ofcom implements full band assignment, keeping 700 MHz in the same award is helpful because it should maximize incentives for all bidders - including H3G - to participate and thus sign up to the obligation to contribute their existing spectrum to the new assignment stage.)

CCA is not a viable auction format for award of 3.6 GHz spectrum

68. [✂][16] In our previous response, we set out why we have no confidence in the ability of Ofcom's proposed multi-band combinatorial clock auction (CCA) design to deliver an efficient auction outcome. We presented powerful arguments why a CCA must not be used to award 3.6 GHz. We also highlighted disadvantages with using a CCA to allocate 700 MHz.[17] These concerns can be addressed by switching to an SMRA type design, such as the hybrid clock-SMRA format used by Ofcom for the PSSR award.

69. There is a further problem with the second price element in the combinatorial format to allocate 3.6 GHz if Ofcom does not adopt full band assignment. In this situation, there are obvious focal points for the demands of Telefonica, BT and Vodafone, owing to our need to establish viable 5G portfolios and position ourselves for trade options to create contiguous footprints. We anticipate that this [✂]. In this context, a second price rule cannot be expected to reflect real opportunity costs, and prices are unlikely to be efficient or fair, and could be highly asymmetric. We would be happy to provide Ofcom with [✂], if Ofcom is unclear on this point.

70. In its decision on setting the annual licence fee (ALF) for UKB's 3.4-3.8 GHz holdings, Ofcom concluded that the appropriate, non-discriminatory response was to set these fees at the same level as the clearing price from the PSSR award. As Ofcom said, "*[t]his puts all operators on a fair, level playing field, and reduces the risk of unintended consequences in particular as regards the future trading of spectrum*." [18] For consistency with the PSSR auction and ALF decision, an auction with a uniform price rule must be used for this award too. Any other approach would, in our view, breach Ofcom's obligations under UK and European law not to discriminate between operators, given the constraints that Ofcom has placed on bidders and its failure to address fully defragmentation.

71. In conclusion, Telefonica's position is that if Ofcom pushes ahead with a CCA design for the allocation of 3.6 GHz, it would be recklessly exposing UK operators and their customers to an undue risk of an inefficient assignment and unjustifiable asymmetry in the prices to be paid by winning bidders. This would contravene Ofcom's statutory duties under domestic and European law to allocate spectrum efficiently and not to discriminate between operators. As such, there would be a material risk that the award is delayed as a result of legal challenge from one or more operators.

An efficient outcome is more likely with a band-specific cap of no more than 140 MHz

72. Telefonica continues to believe that a band-specific spectrum cap of 140 MHz at 3.4-3.8 GHz is necessary, both to support a pro-competitive distribution of spectrum in the core 5G band and to prevent strategic bidding by H3G. In the absence of full band assignment, a 140 MHz cap would also increase the likelihood of an auction outcome that supports trades that defragment the band. This is because it will remove the ability of H3G to bid

[16] [✂]

[17] The case for allowing combinatorial bidding at 700 MHz largely depends on whether or not coverage obligation lots are being allocated. This will be unnecessary if the industry agrees an alternative approach for improving coverage with Ofcom and the Government.

[18] Ofcom, 7 June 2019, Statement: Annual Licence Fees for UK Broadband's 3.4 GHz and 3.6 GHz spectrum, §1.5.

for toehold quantities of spectrum with the objective of blocking rivals from replicating its position.

73. It is long overdue for Ofcom to take a more interventionist approach on spectrum caps. Its laissez-faire approach has led directly to the current situation of gross asymmetry in spectrum holdings between operators. Ofcom's broken approach distorted the 4G market, where it allowed BT to hoard unused spectrum, while Telefonica and (to a lesser extent) H3G suffered for many years with inadequate capacity in key urban areas. Now it risks making the same mistakes with 5G, with H3G in the driving seat as a result of the trading of legacy spectrum [✂].

74. Ofcom needs to acknowledge that the distribution of 5G spectrum matters for competition. Telefonica, BT and Vodafone have all submitted evidence to Ofcom on the importance of securing large contiguous blocks of 5G spectrum. In submissions to Ofcom, H3G may downplay its advantage, but its real views are revealed in recent comments from Shadi Halliwell, its chief marketing officer.[19] Halliwell said "*We're going to take 5G by storm. We believe it's ours to own*." As evidence for this assertion, Halliwell highlighted statements from the other MNOs in submissions to Ofcom explaining "*why Three's contiguous 100MHz spectrum will be the most effective 5G spectrum in the UK*."

75. In this situation, it is unrealistic for Ofcom to expect H3G to be a willing participant in trading of spectrum, except on terms that would give it a huge windfall gain. To bring H3G to the table, Ofcom must use its powers to level the playing field between operators. A 140 MHz cap is an important measure to do this because it will constrain H3G's ability to block rivals from expanding their holdings or defragmenting through trades not involving H3G. A 140 MHz cap would also have no meaningful impact on H3G's willingness to contribute spectrum for defragmentation in a full band assignment scenario, as this will be driven by its desire to bid for 700 MHz, not 3.6 GHz.

The information rule should be tailored to the circumstances of this award

76. In our previous response, we set out our general view that there may sometimes be a trade-off between releasing information about bids made during an auction, so as to promote price discovery, and restricting some information so as to foreclose options for strategic behaviour. We supported Ofcom's proposal to anonymise demand, but we opposed the proposal to obscure aggregate demand data in the clock rounds of a CCA. We could accept restrictions on aggregate demand data if an SMRA format is used. Our views on these points are unaffected by the proposal to add a negotiation phase.

77. The introduction of a negotiation phase should, however, impact Ofcom's approach to the release of information following the completion of the allocation round. To facilitate negotiation, it is important that bidders have access to the same information about spectrum allocation. Telefonica believes that the best way to achieve this would be to adopt a policy of full transparency at the end of the allocations stage. Specifically, Ofcom should provide all winning bidders with full information about the identity of other winners and the amount of spectrum they won at the end of the allocation stage, prior

[19] http://www.mobilenewscwp.co.uk/2019/07/02/threes-5g-will-bring-trickle-down-benefits-to-4g-users/

to bidding in the assignment round. Bid options in the assignment round can then be limited to only those feasible under the rules.

78. A further advantage of full information is that Ofcom could publicly announce the results of the allocation stage as soon as the assignment round bids have been submitted. At this point, given that all bids have now been submitted and cannot be changed, it could also relax rules regarding the release of confidential auction information. This approach may make negotiation easier, as it would eliminate the risk that any winning bidder inadvertently violates auction confidentiality obligations in discussions with other winners.

ANNEX 1: [✂] **cost to UK operators of having non-contiguous spectrum in the 3.4-3.8 GHz band**

1. In this annex, we set out our preliminary findings regarding the technical challenges and costs that would be incurred by an operator that was assigned 5G spectrum in two small or medium-sized blocks, as opposed to one larger contiguous block. Holding an 80-100MHz block of 3.4-3.8 GHz spectrum is superior as it minimises the cost and complexity of deploying equipment, maximises the volume of spectrum that can be dedicated to capacity rather than used for guard band, and maximises the potential speed that an MNO can offer.
2. We find that the costs of attempting to replicate the capacity of a large contiguous block using two discontiguous blocks with the same total bandwidth are [✂]
3. These downsides will have a negative impact on consumers. [✂].
4. In contrast, the costs for an operator to move its frequencies immediately following a 2020 auction would be relatively small. Such movement would also have no downside for consumers.
5. We elaborate on each of these points in the following subsections.
6. [✂]
7. [✂]
8. [✂]
9. [✂]
10. [✂]

Low cost of moving frequencies so all become contiguous

11. In contrast to the high cost of trying to replicate the benefits of contiguous spectrum with non-contiguous blocks, the cost to operators of defragmenting the 3.4-3.8 GHz band are small. There are two reasons for this. Firstly, no UK operator has yet deployed large amounts of 5G equipment. Secondly, within a designated range, equipment for this band can be retuned remotely, so the costs of shifting frequencies with this range are minimal.

12. The only challenge in moving frequencies that we have identified is the fact that the first generation of equipment from Nokia and Ericsson is aimed either at band 42 (B42 – 3.4-3.6 GHz) or band 43 (B43 – 3.6-3.8 GHz). However, the next generation of equipment, available shortly, will be tuneable across the entire 3.4-3.8 GHz range. Bespoke equipment from Huawei covering both bands is already available.

13. [✂]. Therefore, it is clearly preferable to have a clarity on a route to full band assignment earlier rather than later to avoid extra deployment cost.

14. Looking forward, we do not expect operators having spectrum that straddles the boundary of B42 and B43 to be a problem, as this will be a common situation amongst European operators.

15. To date, most European awards have resulted in one operator having contiguous spectrum across B42 and B43):

    a) Austria: Hutchison Drei (3590 – 3690 MHz).

    b) Switzerland: Swisscom (3580-3700 MHz).

    c) Germany: either Telefonica DE or 1&1 Drillisch, to be determined.

    d) Spain: one operator will be split if the total amount of spectrum remains the same and the proposed reconfiguration goes ahead.

    e) Finland: Elisa (3540 – 3670 MHz).

    f) Ireland: FWA operator Imagine and small cell operator Airspan have splits across B42 and B43 in different regions.

16. Telefonica notes that H3G's existing 100 MHz spectrum holding sits across B42 and B43. We suppose that they must be using equipment that covers both bands, most likely from Huawei[20]. If this is the case, then the costs for H3G from moving in the band will be minimal. This is consistent with H3G's pursuit of a private auction to sell assignment positions in the band, including an option which moves all their remaining holdings to the bottom of the band [✂]. We also note that Hutchison Telecommunications, H3G's parent company, has spectrum holdings in Austria that span across B42 and B43, which implies a complementarity to invest in equipment that covers both bands.

[20] https://www.zdnet.com/article/5g-if-you-want-it-this-year-huawei-is-the-only-game-in-town-says-three/